

VIDYAPROVA ACADEMY

Class 8 Mathematics & JEE Foundation Syllabus

Integrated Curriculum Plan: Class 8 School Board & JEE Foundation

Subject: Mathematics

PROGRAM DESCRIPTION

This specialized curriculum is constructed to bridge the gap between middle school foundational proficiency and high-tier competitive problem-solving (JEE Main/Advanced, Olympiads, and NTSE). Each module runs concurrently on a dual track:

1. School Track: Focuses on conceptual clarity, NCERT/CBSE compliance, derivation structures, and descriptive step-by-step problem-solving.

2. Foundation Track: Focuses on non-routine applications, quick elimination techniques, algebraic manipulations, graphical insights, and mathematical rigor.

MODULE 1: NUMBER SYSTEMS (RATIONAL & IRRATIONAL NUMBERS)

School Level Track

- Definition of Rational Numbers (p/q form, $q \neq 0$).
- Properties of Rational Numbers: Closure, Commutativity, Associativity.
- Distributive Property of multiplication over addition and subtraction.
- Role of Zero (Additive Identity) and One (Multiplicative Identity).
- Additive Inverse and Multiplicative Inverse (Reciprocal).
- Representation of rational numbers on the Number Line.
- Finding rational numbers between two given rational numbers (Mean Method).

JEE Foundation Track

- Introduction to Irrational Numbers and Real Number Line topology.
- Decimal expansion behavior: Terminating, Non-terminating Repeating, and Non-terminating Non-repeating.
- Converting non-terminating repeating decimals into p/q form via algebraic methods.
- Density property and advanced insertion of n rational/irrational numbers between two values.
- Introduction to Absolute Value (Modulus function: $|x|$) and simple modular inequalities.

MODULE 2: EXPONENTS, POWERS, CUBES & CUBE ROOTS

School Level Track

- Integral exponents and basic laws of exponents.
- Expressing very small and very large numbers in standard scientific notation.
- Introduction to perfect cubes and geometric representation of a cube.
- Properties of cube numbers (units digit behavior of cubes).
- Finding cube roots through prime factorization method.

JEE Foundation Track

- Fractional, negative, and real exponents.
- Advanced equations involving exponents ($a^x = b$).
- Properties of radical signs, nested radicals, and rationalizing denominators.
- Structural algebraic identity applications to cube roots: $a^3 + b^3 + c^3 - 3abc$.
- Estimation of surds and comparing higher-order indices.

MODULE 3: ALGEBRAIC EXPRESSIONS, IDENTITIES & FACTORIZATION)

School Level Track

- Terms, factors, coefficients, monomials, binomials, and polynomials.
- Operations on algebraic expressions: Addition, Subtraction, and Multiplication.
- Standard Identities: $(a+b)^2$, $(a-b)^2$, $(a-b)(a+b)$, and $(x+a)(x+b)$.
- Concept of factorization: Common factors, regrouping, and using standard identities.
- Factorization of the form $x^2 + px + q$ (splitting the middle term).
- Division of algebraic expressions: monomial and polynomial divisions.

JEE Foundation Track

- Symmetric and alternating expressions.
- Advanced structural identities including $(a+b+c)^2$, $(a+b)^3$ and $(a-b)^3$.
- If $a+b+c=0$, then $a^3+b^3+c^3=3abc$.
- Advanced splitting the middle term (ax^2+bx+c) and Factor Theorem overview.
- Cyclic factorization techniques and algebraic long division with remainders.

MODULE 4: LINEAR EQUATIONS IN ONE VARIABLE)

School Level Track

- Definition of algebraic equations and linear expressions.
- Solving equations having linear expressions on one side and numbers on the other.
- Solving equations with variables on both sides.
- Reducing equations to simpler forms via cross-multiplication.
- Word problems based on numbers, ages, perimeter, and currency denominations.

JEE Foundation Track

- Concept of an Identity versus an Equation.
- Conditions for Unique Solution, Infinite Solutions, or No Solution.
- System of equations reducible to linear form using substitution.
- Advanced word problems: Time & Work, Pipes & Cisterns, Relative Speed, Upstream/Downstream, and Mixtures.
- Graphing linear equations in one and two variables on the Cartesian plane.

MODULE 5: GEOMETRY (UNDERSTANDING QUADRILATERALS & PRACTICAL GEOMETRY)

School Level Track

- Polygons: classification based on sides; convex/concave; regular/irregular.
- Angle Sum Property: Sum of interior angles = $(n-2) \times 180^\circ$.
- Sum of exterior angles = 360° .
- Properties of Trapezium, Kite, Parallelogram, Rhombus, Rectangle, and Square.
- Practical Geometry: construction of quadrilaterals given unique parameters.

JEE Foundation Track

- Formal geometric proofs and logical deductions from definitions.
- Internal and external angle bisector theorems of regular polygons.
- Advanced properties of parallelograms and triangles: Mid-point theorem and intercept theorem.
- Interrelationship of polygons, cyclic quadrilaterals preview, and area theorems.

- Locus concepts in construction and uniqueness of shapes.

MODULE 6: MENSURATION)

School Level Track

- Area of a Trapezium and general quadrilaterals.
- Area of a Rhombus using its diagonals.
- Surface Area of a Cube, Cuboid, and Right Circular Cylinder.
- Volume and Capacity of Cube, Cuboid, and Right Circular Cylinder.
- Standard conversions of metric units of area and volume.

JEE Foundation Track

- Area of 2D regular polygons using inscribed and circumscribed circles overview.
- Problems involving paths, borders, cutting corners, and unfolding 3D surfaces (nets).
- Concept of scaling: perimeter, area, and volume scaling.
- Advanced combined solids: volume and surface areas of composite objects.
- Optimization principles: maximum area for a given perimeter.

MODULE 7: COORDINATE GEOMETRY & INTRODUCTION TO GRAPHS)

School Level Track

- Types of graphs: Bar graph, Pie chart, Histogram, Linear graph.
- Cartesian coordinate plane: axes, origin, and quadrants.
- Plotting points given their coordinates (x, y).
- Reading and interpreting simple linear relationship graphs such as Time-Distance and Quantity-Cost graphs.

JEE Foundation Track

- Distance formula between two coordinate points.
- Midpoint formula and Section Formula (Internal division).
- Concept of Slope (m) and equation of a straight line ($y = mx + c$).
- Graphical solutions of simultaneous linear equations.
- Shading regions represented by linear inequalities.

ASSESSMENT MATRIX & COMPETITIVE BENCHMARKS

Assessment Type	Focus
School Assessment Formats	Subjective written papers focusing on step-marking, axioms, and neat construction diagrams.
JEE Foundation Assessment Formats	Single Correct Option MCQs; Multiple Correct Options MCQs for analytical depth; Integer